

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**

Remarks

Reconsideration of this Application is respectfully requested.

Upon entry of the foregoing amendment, claims 1-27 and 31-54 are pending in the application, with 1, 8, 13, 18, 22, 36, 39, and 42 being the independent claims. Claims 1, 2, 8-10, 13-15, 18, 19, 22, and 25 are sought to be amended. The amendments to claims 1, 2, 8-10, 13-15, 18, 19, 22, and 25 are made to more particularly claim the present invention, not to amend around cited art, and are thus not intended to limit the range of any equivalents. New claims 31-54 are sought to be added. These changes are believed to introduce no new matter, and their entry is respectfully requested.

Based on the above amendment and the following remarks, Applicants respectfully request that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

Examiner Interview

Applicants would like to thank Examiner Soward for the courteous Examiner Interview conducted at the U.S. Patent and Trademark Office on April 2, 2003, with Applicants' representative Jeffrey S. Weaver, Reg. No. 45,608.

Objection to the Title

The Examiner has objected to the current title of the application and required Applicants to revise it. Applicants have amended the title to better reflect the claimed

invention. Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw this objection.

Rejections under 35 U.S.C. § 102

Claims 1-8, 13, 16, and 17 have been rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,020,637 to Karnezos (hereinafter Karnezos). Applicants respectfully traverse the rejection, and request that it be withdrawn.

Technical differences exist between Karnezos and the present invention. Independent claims 1, 8, and 13 of the present invention relate to substrates in integrated circuit (IC) packages. Claims 1, 8, and 13, as amended, each recite that the substrate has opposing first and second surfaces, that one of the first and second surfaces has a plurality of solder ball contacts pads formed thereon, wherein the first surface has a central opening, and the central opening has an edge.

Independent claim 1 recites the edge including at least one protruding edge portion that extends into the central opening. Independent claim 8 recites the edge including at least one recessed edge portion. Independent claim 13 recites the first surface of the substrate including at least one hole proximate to the edge of the central opening. Karnezos does not teach or even suggest these features of independent claims 1, 8, and 13.

Accordingly, Applicants respectfully submit that independent claims 1, 8, and 13 are patentable over Karnezos, for at least these reasons. Furthermore, new independent claims 36, 39, and 42 are patentable over Karnezos for at least the same reasons. Claims 2-7, 16, 17, and new claims 31, 37, 38, 40, 41, and 43-46, which depend therefrom, are

also patentable for at least these reasons, and further in view of their own features.

Applicants therefore request that the Examiner reconsider and withdraw the rejection of these claims.

Rejections under 35 U.S.C. § 103

Claims 9-12, 14, 15, and 18-27 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Karnezos in view of U.S. Publication No. 2002/0072214 A1 to Yazawa *et al.* (hereinafter Yazawa). Applicants respectfully traverse the rejection, and request that it be withdrawn.

For at least the reasons described above, claims 1-8, 13, 16, and 17 are patentable over Karnezos. Furthermore, Applicants assert that Yazawa does not supply the missing teachings. Thus, claims 9-12, 14, and 15, and new claims 32, 33, and 47-50, which depend from claims 9 and 14, are also patentable over Karnezos and Yazawa, alone or in combination, for at least these reasons, and further in view of their own features.

Furthermore, Applicants assert that independent claim 22 is patentable over Karnezos and Yazawa, alone or in combination, for at least the reasons described above relating to independent claims 1, 8, and 13, and further in view of its own features. Claims 23-27, and new claims 35, 53, and 54, which depend from claim 22, are also patentable over Karnezos and Yazawa, alone or in combination, for at least these reasons, and further in view of their own features.

Technical differences exist between claim 18 of the present invention, and Karnezos and/or Yazawa. Independent claim 18 relates to a substrate in an integrated circuit (IC) package. As recited in claim 18, one of opposing first and second surfaces of

the substrate has a plurality of solder ball contacts pads formed thereon. As further recited in claim 18, the first surface of the substrate has a central opening, and the central opening has an edge. As further recited in claim 18, a first portion of the edge is configured to cover a first portion of a central bondable ring of a stiffener when the substrate is coupled to the surface of the stiffener, and a second portion of the edge is configured to expose a second portion of the central bondable ring when the substrate is coupled to the surface of the stiffener. Karnezos, alone or in combination with Yazawa, does not teach or even suggest this feature of independent claim 18.

Accordingly, Applicants respectfully submit that independent claim 18 is patentable over Karnezos and Yazawa, alone or in combination, for at least these reasons. Claims 19-21, and new claims 34, 51, and 52, which depend from claim 18, are also patentable for at least these reasons, and further in view of their own features.

Applicants therefore request that the Examiner reconsider and withdraw the rejection of claims 9-12, 14, 15, and 18-27.

Conclusion

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicants believe that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will

expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment and Reply is respectfully requested.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

A handwritten signature in black ink, appearing to read 'Jeffrey S. Weaver', with a long horizontal line extending to the right.

Jeffrey S. Weaver
Attorney for Applicants
Registration No. 45,608

Date: 4-16-03

1100 New York Avenue, N.W.
Suite 600
Washington, D.C. 20005-3934
(202) 371-2600

Version with markings to show changes made

The claims were amended as follows:

1. (Amended) A substrate in an integrated circuit (IC) package, comprising:
[a first surface that] opposing first and second surfaces, wherein one of said first and said second surfaces has a plurality of solder ball contacts pads formed thereon, wherein said first surface has a central opening,
wherein said central opening has an edge,
wherein said edge includes at least one protruding edge portion that extends into said central opening,
whereby said at least one protruding edge portion provides a shorter distance between a trace on said first surface and an IC die relative to a distance between the trace and the IC die when said at least one protruding edge portion is not present.

2. (Amended) The substrate of claim 1, wherein the substrate is capable of being coupled to a surface of a stiffener that has a central [ground] bondable ring, wherein said at least one protruding edge portion is configured to extend across a portion of the central [ground] bondable ring when the substrate is coupled to the stiffener surface.

8. (Amended) A substrate in an integrated circuit (IC) package, comprising:
[a first surface that] opposing first and second surfaces, wherein one of said first and said second surfaces has a plurality of solder ball contacts pads formed thereon, wherein said first surface has a central opening,
wherein said central opening has an edge,
wherein said edge includes at least one recessed edge portion,
whereby said at least one recessed edge portion provides access to a portion of a surface of a stiffener attached to the substrate relative to when the at least one recessed edge portion is not present.

9. (Amended) The substrate of claim 8, wherein the substrate is capable of being coupled to a surface of a stiffener that has a central [ground] bondable ring, wherein said at least one recessed edge portion is configured to expose a portion of the central [ground] bondable ring when the substrate is coupled to the stiffener surface.

10. (Amended) The substrate of claim 9, wherein said at least one recessed edge portion is configured to allow a corresponding [ground] bond wire to couple an IC die mounted on said surface of said stiffener to said central [ground] bondable ring.

13. (Amended) A substrate in an integrated circuit (IC) package, comprising:

[a first surface that] opposing first and second surfaces, wherein one of said first and said second surfaces has a plurality of solder ball contacts pads formed thereon, wherein said first surface has a central opening,
wherein said central opening has an edge,
wherein said first surface includes at least one hole proximate to said edge,
whereby said at least one hole proximate to said edge provides access to a portion of a surface of a stiffener attached to the substrate relative to when the at least one hole proximate to said edge is not present.

14. (Amended) The substrate of claim 13, wherein the substrate is capable of being coupled to a surface of a stiffener that has a central [ground] bondable ring, wherein said at least one hole is configured to expose a portion of the central [ground] bondable ring when the substrate is coupled to the stiffener surface.

15. (Amended) The substrate of claim 14, wherein said at least one hole is configured to allow a corresponding [ground] bond wire to couple an IC die mounted on said surface of said stiffener to the exposed portion of the central [ground] bondable ring.

18. (Amended) A substrate in an integrated circuit (IC) package, comprising:

[a surface that] opposing first and second surfaces, wherein one of said first and said second surfaces has a plurality of solder ball contacts pads formed thereon, wherein said first surface of the substrate has a central opening, wherein said central opening has an edge;

[at least one] a first trace on said first surface of the substrate proximate to a first portion of said edge;

a second trace on said first surface of the substrate proximate to a second portion of said edge;

wherein [said] the substrate is capable of being coupled to a surface of a stiffener that has a central [ground] bondable ring, wherein said first portion of said edge is configured to cover a first portion of the central [ground] bondable ring when the substrate is coupled to [said] the surface of [said] the stiffener, and said second portion of said edge is configured to expose a second portion of the central bondable ring when the substrate is coupled to the surface of the stiffener;

whereby said first portion of said edge allows for a shorter distance between said first trace and an IC die relative a distance between said second trace and the IC die.

19. (Amended) The substrate of claim 18, wherein said second portion of said edge is configured to allow a wire to couple an IC die to [said at least one trace] the second portion of the central bondable ring.

22. (Amended) An integrated circuit (IC) package, comprising:
a substrate that has [a] opposing first and second surfaces, wherein one of said first and said second surfaces has a plurality of solder ball contact pads formed thereon,
wherein said first surface has a central opening;

a stiffener that has a first surface, wherein said first surface of said stiffener has a central [ground] bondable ring, wherein said first surface of said stiffener is attached to said substrate;

wherein said central opening has an edge, wherein said edge includes at least one of:

(a) a protruding edge portion that extends across at least a portion of said central ground ring,

(b) a recessed edge portion that exposes a portion of said central ground ring,
or

(c) a hole proximate to said edge, wherein the hole exposes a portion of said central ground ring.

25. (Amended) The IC package of claim 22, wherein said first surface of said stiffener has a central cavity that coincides with said central opening of said substrate, wherein said central [ground] bondable ring surrounds said central cavity.

Claims 31-54 are new.